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January 8, 2021

Arthur Burbank
USDA Forest Service
4350 South Cliffs Dr.
Pocatello, ID 83204

**Subject: Biological Selenium Removal Treatment Technology**
**Water Treatment Pilot Study**
**November 2020 Progress Report**

Dear Art,

This progress report summarizes key activities in November 2020 associated with Phase 2 of the Water Treatment Pilot Study located near Hoopes Spring. This Pilot Study is being conducted as part of the Smoky Canyon Mine Remedial Investigation/Feasibility Study (RI/FS) to provide information on the effectiveness of the active biological treatment system in removing selenium and other COPCs from South Fork Sage Creek Springs and Hoopes Spring.

Work related to the approved Phase 2 Pilot Study continues at the site in accordance with the Final *Phase 2 Pilot Study Work Plan and Sampling and Analysis Plan, Ultra-Filtration/Reverse Osmosis and Biological Selenium Removal Fluidized Bed Bioreactor Treatment Technology* (Phase 2 WP/SAP).

## Identification of Deliverables and Data Transmittals

There were no outstanding deliverables or transmittals for the month of November. At the time of this report, we have received laboratory data for Week 143 and Week 145. Preliminary laboratory data are presented in Table 1. The field data for the Week 143, and 145 sampling events is summarized in Table 2.

## Completed Activities

The following activities associated with the Phase 2 Pilot Study were completed in November 2020:

- Continued system operation and treatment of selenium.

The Treatment System Pilot (TSP) influent total selenium concentration for Week 143 was 166 ug/L and 175 ug/L for Week 145. The Treatment System Pilot effluent total selenium concentration for Week 143 was 12.3 ug/L and 14.8 ug/L for Week 145. The average removal efficiency for November was approximately 93% for total selenium removal.

The average flow of the TSP for the month of November was 1,625 gpm. Since full scale operations began in early December 2017 approximately 2.387 billion gallons of impacted water has been treated. The mass of selenium removed from December 2017 through November 2020 is approximately 2,613 pounds.

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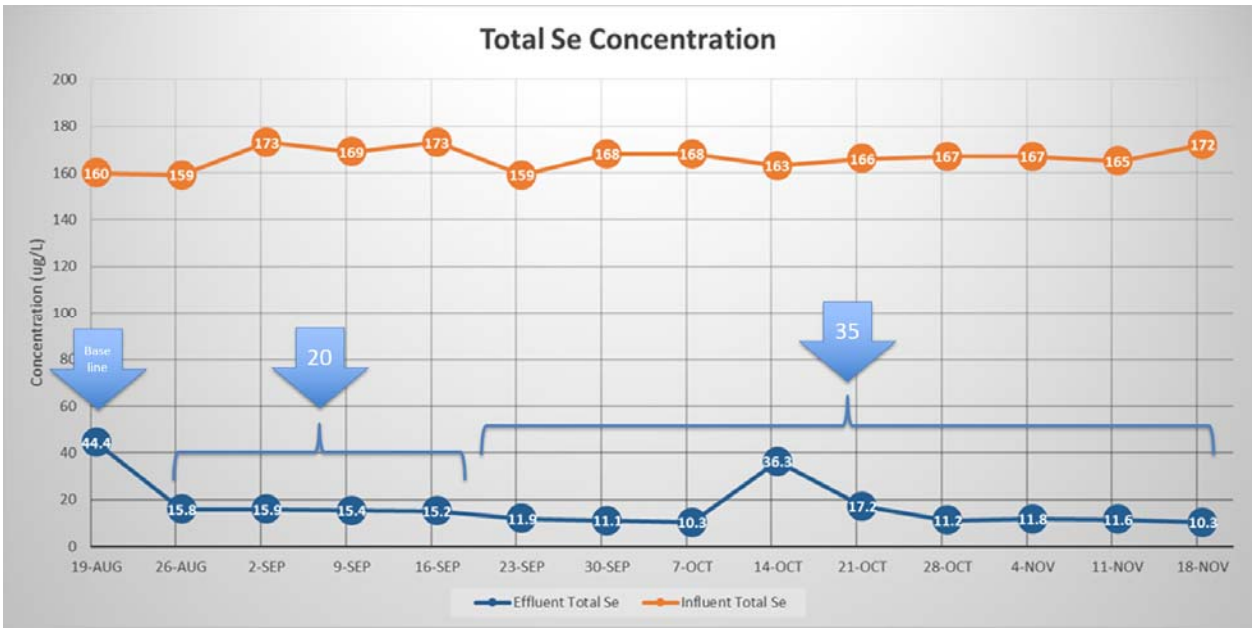
As outlined in our May 11, 2020 letter, a 90 day full scale co-precipitation trial was conducted from August to November 2020. The trial was a first of its kind system that minimized the need for new equipment. The design repurposed existing pumps that were not needed for normal TSP operations. New ferric chloride (ferric) distribution tubing was installed from the chemical storage area to the Aeration Tanks where the ferric was dosed. Minor changes to the plant controls system were required to operate and monitor the ferric addition. In order to manage the increased solids generation, changes to the dewatering methodology and solids disposal schedule were required.

The initial ferric chloride dose was set at 20 mg/L until the system stabilized (four weeks) and then the dose was increased to 35 mg/L for the remainder of the trial. Samples were collected from key locations in the process and analyzed in the onsite lab (when appropriate) and at a third party lab (when needed). Samples were collected on August 19, 2020 immediately before starting the co-precipitation trial in order to provide baseline concentrations. Due to a plant power outage, ferric was not added the day before the October 14 sample, which caused higher than normal effluent concentrations in the October 14 and 21 samples.

As shown in the chart below, influent total selenium concentrations over the trial ranged from 159 to 173 µg/L with an average of 166 µg/L. The baseline effluent total selenium concentration was 44.4 µg/L. The average effluent concentration during the 20 mg/L ferric dose was 15.6 µg/L. When the ferric dose was increased to 35 mg/L, the average effluent concentration dropped to 11.2 (when the October 14 and 21 samples are disregarded). Total selenium removal percentages during the trial were routinely 93 to 94%.




Samples were analyzed for total selenium and selenium species (selenate and selenite) on a weekly basis. Selenate concentrations are not impacted by ferric addition, therefore the effluent selenate concentrations during the trial remained consistent at about 5 µg/L (except during the October 14 sample event). The following chart shows the effectiveness of the co-precipitation system in removing selenite. The baseline effluent selenite concentration was 36.8 µg/L. The

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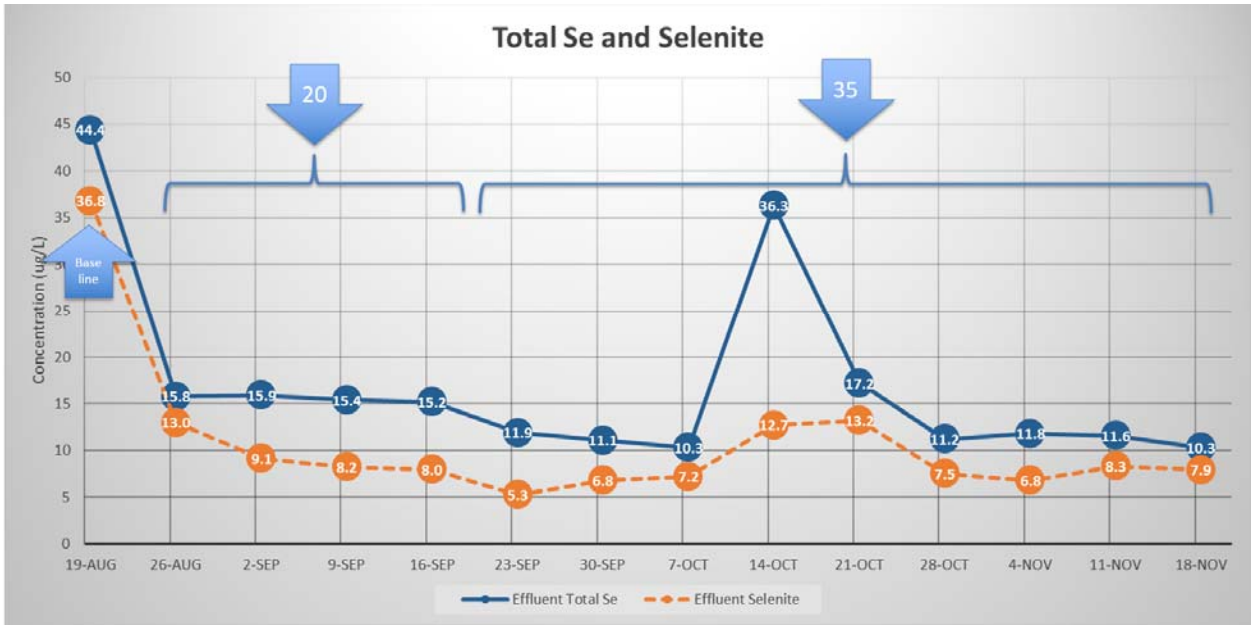
average selenite concentration in the effluent during entire trial was 8.7 µg/L, which represents a 76% reduction in effluent selenite. At a 20 mg/L ferric dose the average selenite concentration in the effluent was 9.6 µg/L, at a 35 mg/L ferric dose the average selenite concentration drop to 7.1 µg/L (when the October 14 and 21 samples are disregarded).




Overall, the results of the full scale co-precipitation trial over these 90 days appear to be effective and add to the significant accomplishments achieved so far at the TSP.

## Upcoming Activities

The following activities associated with the Phase 2 Pilot Study are planned through December 2020:

- Continue system monitoring in accordance with the sampling and analysis plan.
- The 90-day co-precipitation trial will terminate on January 13. Simplot will evaluate all data and operation information to determine future actions incorporating iron co-precipitation operations.

Please contact me if there are questions regarding this monthly progress report.

Sincerely,

Jeffrey Hamilton
Environmental Engineer

cc:

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**Table 1**
**Laboratory Results Focused Analyte List**

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, Performance Monitoring

| | | Week 143 | | | Week 145 | | |
|---|---|---|---|---|---|---|---|
| **Station >>** | | Influent | Ultra Filtration Backwash | Effluent | Influent | Ultra Filtration Backwash | Effluent |
| **Sample ID >>** | | SC1120-LSSHS-IN001 | SC1120-LSSHS-UFB001 | SC1120-LSSHS-EF001 | SC1120-LSSHS-IN002 | SC1120-LSSHS-UFB002 | SC1120-LSSHS-EF002 |
| **Date >>** | | 11/11/2020 | | | 11/23/2020 | | |
| **Analyte** | **Units** | | | | | | |
| **General Chemistry** | | | | | | | |
| Ammonia, as N | mg/L | 0.026 U | 0.026 U | 0.026 U | 0.026 U | 0.026 U | 0.026 U |
| Biochemical Oxygen Demand | mg/L | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U |
| TSS | mg/L | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U |
| **Nutrients** | | | | | | | |
| Nitrate, as N | mg/L | 0.34 | 0.31 | 0.34 | 0.43 | 0.21 | 0.19 |
| Sulfide | mg/L | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| Phosphorus, Total | mg/L | 0.0338 | 0.0439 | 0.0247 | 0.0237 | 0.0316 | 0.0425 |
| **Metals and Metalloids** | | | | | | | |
| Selenium, Dissolved | mg/L | 0.177 | 0.126 | 0.0125 | 0.178 | 0.0673 | 0.0146 |
| Selenium, Total | mg/L | 0.166 | 0.122 | 0.0123 | 0.175 | 0.067 | 0.0148 |

**Notes**
Results presented are preliminary, and have not been validated at the time of this report.
U - Analyte not detected above the method detection limit (MDL).
J - Result is estimated.

**Table 2**
**Field Water Quality Data**

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, Performance Monitoring

| | | Parameter >> | Dissolved Oxygen | ORP | pH | SC | Temperature | Turbidity |
|---|---|---|---|---|---|---|---|---|
| | | Units >> | mg/L | mV | SU | umhos/cm | C | NTU |
| **Station** | **Sample ID** | **Date** | | | | | | |
| **Week 143** | | | | | | | | |
| Influent | SC1120-LSSHS-IN001 | 11/11/2020 | 8.06 | 176 | 7.74 | 508 | 13.09 | 1.2 |
| Ultra Filtration Backwash | SC1120-LSSHS-UFB001 | 11/11/2020 | 8.50 | 183 | 7.48 | 389 | 13.05 | 3.3 |
| Effluent | SC1120-LSSHS-EF001 | 11/11/2020 | 8.37 | 193 | 7.09 | 486 | 12.97 | 0.0 |
| **Week 145** | | | | | | | | |
| Influent | SC1120-LSSHS-IN002 | 11/23/2020 | 8.16 | 177 | 7.77 | 516 | 13.03 | 1.1 |
| Ultra Filtration Backwash | SC1120-LSSHS-UFB002 | 11/23/2020 | 8.16 | 179 | 7.5 | 392 | 13.08 | 3.0 |
| Effluent | SC1120-LSSHS-EF002 | 11/23/2020 | 8.29 | 190 | 7.08 | 492 | 13.01 | 0.1 |

**Notes:**